# 4C

# Normalizing Urban Water Use Data

Some of the public comments the Department received on the draft Bulletin 160-98 dealt with how normalized urban water use data were developed and why normalized data differed from actual water production data. This appendix is provided to address those comments.

Bulletin 160-98 estimates of urban water use begin with raw data from the Department's survey of public water systems. This survey provides local agencies' annual water production which, when combined with population data, can be shown as agency per capita water production. For each of the Bulletin 160 DAUs (or in some cases, PSAs) representative water purveyors are selected, and their production data are quality-controlled to fill in missing data points, check production numbers, and resolve inconsistencies in the data.

Figure 4-4 in Chapter 4 showed how average statewide urban water production has varied over time. Information used to prepare the figure came from the public water systems surveys. Figure 4C-1 shows sample data for 12 cities or water agencies, to illustrate geographic variability in production, together with statewide average water production. These plotted data do not include self-produced water, water that is developed by entities for their own use. Most self-produced water is developed by industrial users. The Department estimates quantities of self-produced water through periodic surveys of industrial water users.

Statewide, the residential sector accounts for over half of total urban water use. The landscape component of residential (and some commercial and institutional) use strongly influences year-to-year variations in urban use, reflecting availability of precipitation and other water sources. Landscape water use increases in dry years in most parts of the State, if water supplies are available, since less precipitation occurs. Regional variations in landscape water use reflect climatic differences and the extent to which available water supplies depend on local precipitation or on supplies from other sources.

FIGURE 4C-1

**Sample Urban Water Production Data**

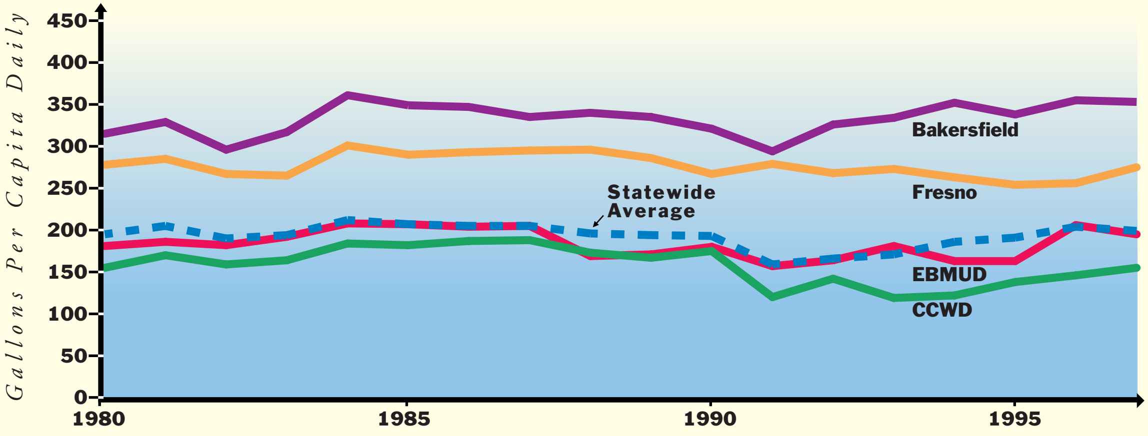


FIGURE 4C-1
**(continued)**

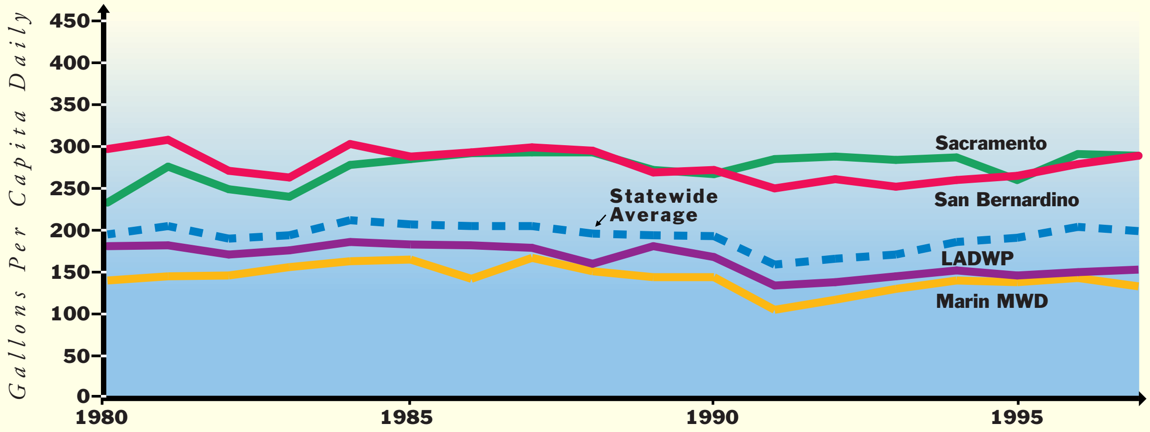
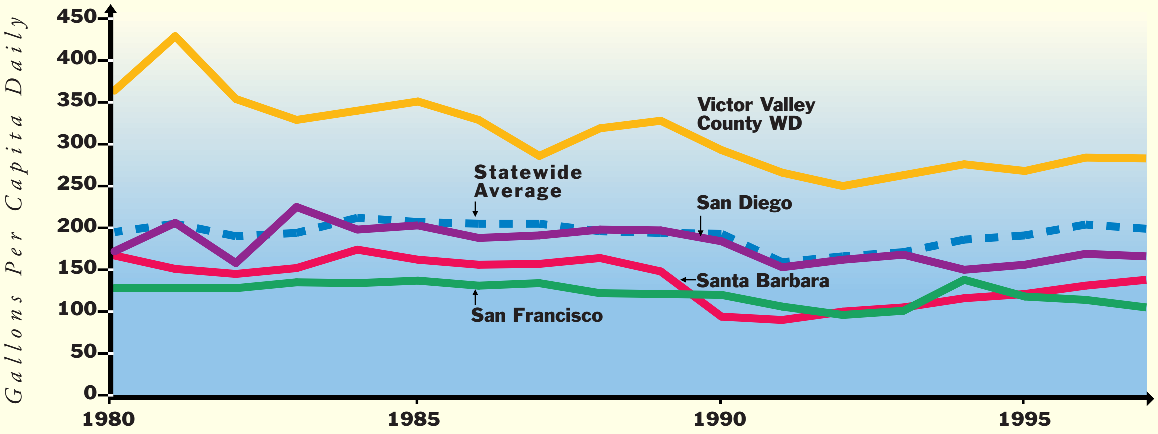


FIGURE 4C-1
**(continued)**



Addressing the impacts of the 1987-92 drought was a major consideration in reviewing the water purveyor data used for Bulletin 160-98. As shown in Figure 4-4, statewide average urban per capita water production declined during the drought years due to water rationing and other short-term restrictions in use, but then began to rebound. Capturing this rebound effect was important to estimating 1995 normalized urban use for Bulletin 160-98. As described in Chapter 4, the normalizing process is intended to remove water use irregularities due to droughts, extremely wet years, or other conditions. Calendar year 1995 was a wet year. Actual urban water production data for 1995 are thus lower than the Bulletin 160 normalized urban water use data.

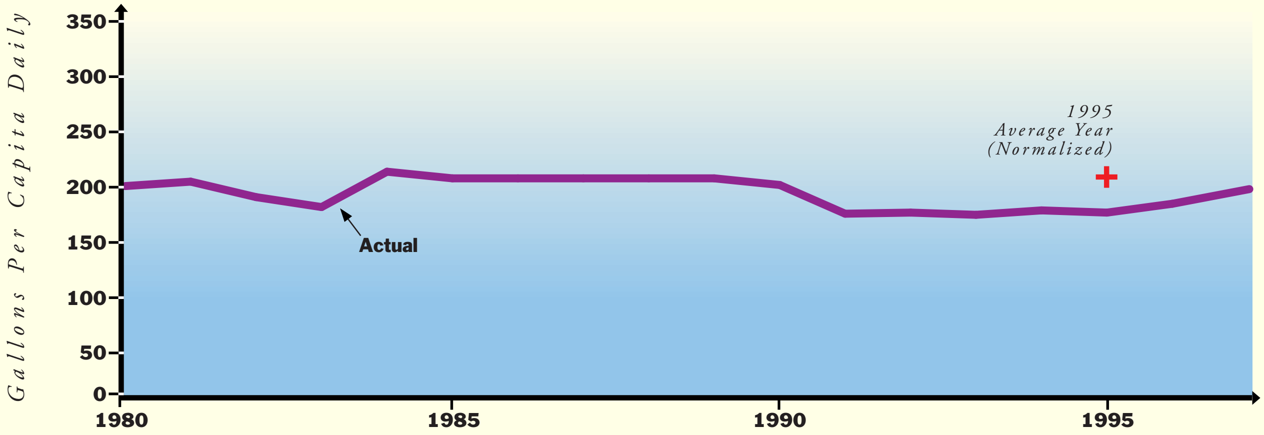
Normalized urban water use is calculated for each DAU, except in the sparsely populated desert areas in southeastern California, where calculations are done at a PSA level. Recent production data from representative water purveyors are combined with normal water supplies and water use patterns to produce a composite per capita water production value for each DAU. Data for years during and immediately following the drought are removed from consideration due to the effects of water shortages of unprecedented severity and duration and a multi-year rebound in per capita water use. The composite per capita water production value is adjusted to account for self-produced water supplies, permanent effects of urban BMPs, and post-1990 changes to federal and State plumbing fixture standards to result in base year per capita water use.

The amount by which a normalized value differs from actual production data for a given year varies from DAU to DAU, as shown in Figure 4C-2 for some sample DAUs. (The 1995 statewide average normalized per capita urban water use was 229 gpcd, of which 9 gpcd represented self-produced water.) Normalized per capita water use data (water purveyor production plus self-produced water) are multiplied by the corresponding population to arrive at base 1995 normalized urban water use for each DAU. When DAU-level information is combined into hydrologic regions for Bulletin 160 water budgets, the "other" component of urban water use is added to the regional water budgets. This "other" component is small in comparison and includes recreation water use, energy production water use, and losses from major conveyance facilities. (With the addition of the "other" component, total 1995 normalized statewide average per capita water use is 244 gpcd.)

FIGURE 4C-2

**Actual and Normalized Production Data**

**Orange DAU 96**



**San Jose DAU 44**

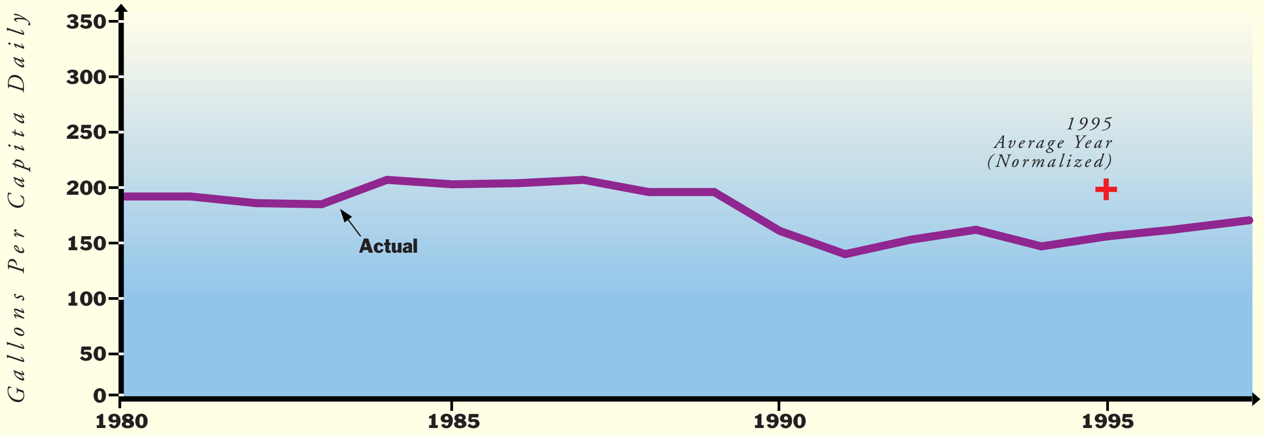
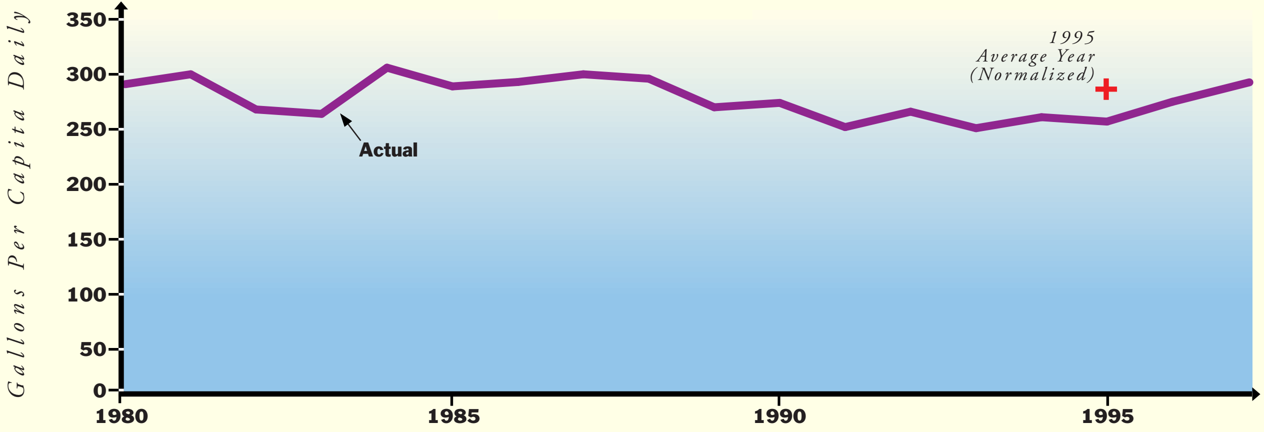


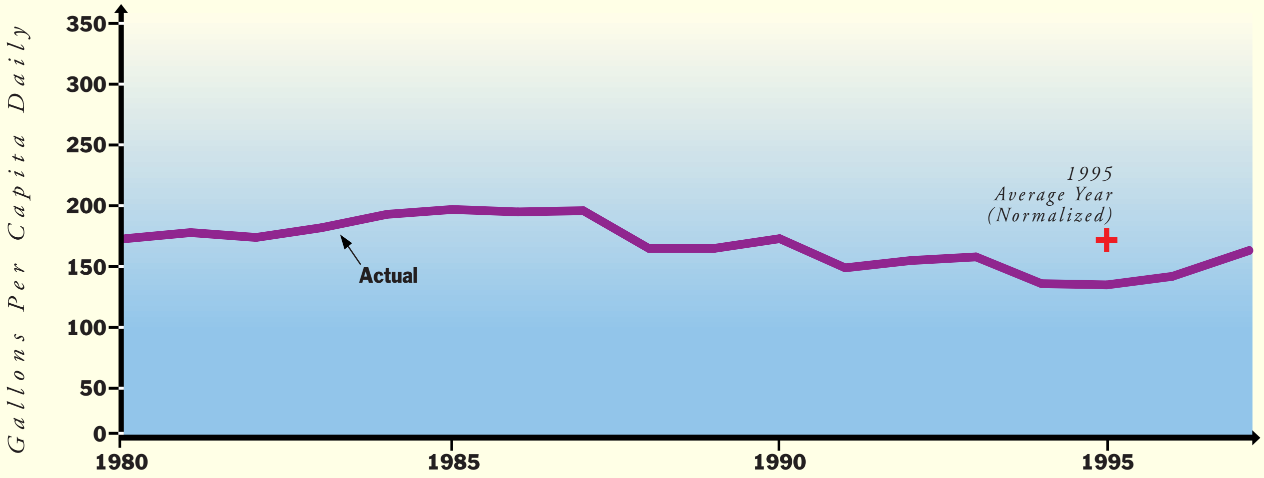
FIGURE 4C-2

**(continued)**

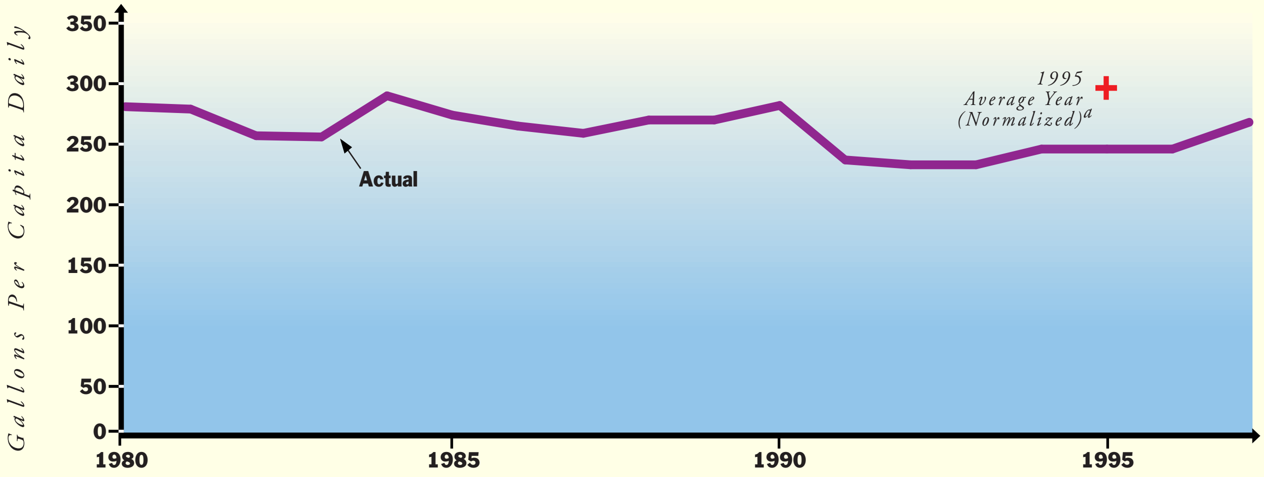
### Placer DAU 172



### Oakland DAU 47 (Alameda County portion)



### Fresno DAU 233



[a] Includes 29 gpcd self-produced industrial water use not accounted for in the plot of actual production data.